UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/761,240	01/17/2001	Josef-Georg Bauer	GR 98 P 2124 P	5138

24131 7590 04/27/2007
LERNER GREENBERG STEMER LLP
P O BOX 2480
HOLLYWOOD, FL 33022-2480

EXAMINER	
MONDT, JOHANNES P	
ART UNIT	PAPER NUMBER
3663	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/761,240	BAUER ET AL.	
	Examiner	Art Unit	
	Johannes P. Mondt	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5,7 and 8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5,7 and 8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Amendment filed 2/15/07 forms the basis for this Office Action. In said Amendment Applicants substantially amended claims 5, 7 and 8 through substantial amendment of independent claim 5. Comments on Remarks submitted with said Amendment are included below under "Priority" and "Response to Arguments".

Priority

The filing of Demand on 2/8/200 is herewith acknowledged. However, a certified copy of the foreign priority document is still not available, as mentioned in the previous office action (page 2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. ***Claims 5, 7 and 8*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze (5,610,415) in view of Rosling et al (IEEE Transactions on Power Electronics, Vol. 9, No. 5, September 1994, pages 514-521).

On claim 5: Schulze teaches a power semiconductor element, namely a GTO thyristor (title, abstract and col. 1, l. 5-32) comprising:

an emitter region 4 (either n-doped or p-doped; see col. 1, l. 47-col. 2, l. 37); and a stop zone 9 (col. 2, l. 3-43) in front of said emitter region (namely in region 9; see Figure),

said stop zone having foreign atoms, and, in the case of n-doped emitter 4 having foreign atoms of p-type conductivity, such as for instance gold (Au), cadmium (Cd), zinc (Zn), or nickel (Ni); in the case of p-doped emitter 4 having foreign atoms of n-type conductivity such as barium (Ba), molybdenum (Mo), niobium (Nb), or cesium (Cs) (see col. 2, l. 11-20). Hence, said emitter region and said stop zone have mutually opposite conductivities, namely n- type and p-type, or p-type and n-type, respectively.

Schulze does not explicitly teach the limitation that said foreign atoms have at least one energy level within the band gap of the semiconductor and at least 200 meV away from both valence and conduction band of said semiconductor, being silent on the material embodiment of the semiconductor in explicit terms. However, it would have been obvious to select silicon for said semiconductor, because thyristors are in their most common embodiment made of a silicon semiconductor layer, as witnessed for instance by Rosling et al: e.g., see Abstract, second paragraph, and "I. Introduction", page 514, second column, second paragraph). *Motivation* to select silicon for the semiconductor embodiment derives at least from the well-tested and cheaply manufactured device thus configured. Furthermore, Applicant is reminded that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416. *Combination*

of the teaching by Rosling et al with the invention by Schulze immediately satisfies said limitation because gold (as acceptor (A): 290 meV), barium (as donor (D): 320 meV), cesium (as donor (D): 300 meV), molybdenum (300 meV), nickel (as acceptor (A) 350 meV) have at least one energy level within the band gap of silicon and 200 meV away from both the conduction band and valence band of silicon, as witnessed by the collected and evaluated data in Sze as made of record 5/15/02, page 21, Figure 13.

In the combined invention the limitation "such that, depending on whether the power semiconductor element is performing a conducting operation or a blocking operation, said stop zone is only partially electrically active in the on-state and fully electrically active in the off-state for carriers emitted by the emitter region" is satisfied by admission by Applicant, because Applicant admits that said performance is achieved because of "the creation of energy levels by the doping atoms, within the band gap of the semiconductor material, lie far away from the energy levels of the conductance band and the valence band" (see [0011] in the published application or page 3 of the Specification as originally filed).

Also, in reference to the claim language referring to the aforementioned limitation, intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963). In the underlying case, the stop zone by Applicant and the stop zone by Schulze located as it is in front of the

emitter zone and abutting the base of first type conductivity do not distinguish structurally in that in both stop zones the doped atoms are subject to similar electric forces in both the ON state and OFF state (conducting and blocking operation, resp.).

On claims 7-8: from applicant's specification the desirability of both selenium and sulfur as foreign atoms is explained solely on the basis of the adequate minimum distance of 200 meV of the energy levels of selenium and sulfur as donors from the band gap of silicon. Selenium and sulfur share this property with the donors cesium, molybdenum, and barium taught by this prior art in the form of Schulze. *Therefore, the materials selected by the prior art are understood to be suitable to make the device.* Applicant is reminded in this regard that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

Response to Arguments

Applicant's arguments filed 2/15/07 have been fully considered but they are not persuasive. In particular, Applicant's argument that "the prior art references cited in the Office Action fail to teach or suggest, among other limitations of Applicants' claims, the amount to which a stop zone is electrically active being dependent upon whether the power semiconductor element is performing a blocking operation or a conducting operation" is incorrect because the conditions for this to be achieved are met despite the absence of a verbatim recitation in said prior art references: in the combined invention the condition sufficient by admission of Applicant for the aforementioned

partial and full electrical activity of said stop zone under conducting resp. blocking operations is fulfilled: indeed, in the application the conditions are achieved by forming energy levels created by the doping atoms which, within the band gap of the semiconductor material, lie far away from the energy levels of the conductance and valence bands" (page 3 of the original Specification, see also [0011] in the published Application). Furthermore, the newly included limitation limits conditions during operation of the device, and as such involved limitations on intended use. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. No such structural limitation has been put forward. In view of the above considerations, the claims stand rejected over the same prior art as applied in the previous office action.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JPM
April 21, 2007

Primary Patent Examiner:

Johannes Mondt (Art Unit: 3663)